

Cost Information and the Lean Enterprise

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*“Lean initiatives do not immunize an organization against
the laws of economics.”*

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Executive Summary

- Traditional accounting methods, particularly traditional costing methods, do not serve the information needs of lean enterprises.
- Some have suggested simplifying the lean enterprise's costing methods by assigning a vast majority of its costs directly to its primary value stream(s).
- Although this approach may make it easier to measure short-term manufacturing performance, it hamstrings top management's ability to make quality pricing, investment, and other decisions that are necessary to insure the company's long-term success.
- No management initiative serves all of management's needs. To succeed in the long-term, managers must understand and use different concepts for different purposes.
- To effectively exploit the benefits generated by its lean initiatives, a lean enterprise needs to incorporate both the concept of activity-based costing and the principles of managerial economics into its decision making processes.
- Activity-based costing provides the structure for understanding the impact on product, service, process, and customer costs resulting from lean initiatives. It also provides the mechanics necessary for measuring the incremental impact on costs of proposed management decisions and actions.
- Managerial economics provides the appropriate cost measurements, particularly the measurement of cost of capital, critical to understanding the impact of lean initiatives on the organization.
- Without including a cost of capital, a lean enterprise cannot measure the "with less" benefits of "doing more with less."
- Without including activity-based costing and managerial economics into its decision making equations, the lean enterprise puts itself at risk of "leaning itself out of business."

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I should state at the outset that I am a BIG fan of Lean Thinking. I am also a fan of Theory of Constraints, Just-In-Time, Economic Value-Added, Mass Customization, Build-to-Order, Activity-Based Costing/Management, Performance Measurement, Balanced Scorecards and a variety of other well founded concepts. I am not a “monotheorist.” Like the old pagans of the Roman Empire, who had different gods for different purposes, I believe that executives require different intellectual models for different purposes.

Most phenomena encountered by human beings are far too complex for them to completely comprehend. Whether it is the way the economy works, a computer works, family relationships work, or a business organization works, we cannot completely comprehend all of the complexities involved. Yet we must still function in a world where these phenomena exist. To do so we create “models” of those phenomena that incorporate what we perceive to be its most important parts and the relationships between those parts. The late Dr. Alfred R. Oxenfeldt, a long-time decision economist and consultant, put it this way, “The brain works by constructing an internal version of the outside world.”¹ He goes on to say, “...the validity of [the brain’s] conclusions depend largely upon whether these internal representations accurately mirror the outside world.”²

We build these models from our own, individual perspectives. In business, plant managers have a different perspective than financial accountants. Their view is generally short-term. Their models are constructed around the need to get products “out the door,” on time, and in the most cost-efficient manner. Financial accountants’ models are concerned with compliance. They are constructed around the need to generate financial statements that comply with all laws, regulations, and promulgations in a timely fashion. Similarly, sales managers have a different perspective, as do cost accountants, materials managers, and department foremen. Each individual constructs an “internal version of the outside world” that meets their needs and enables them to function in a complex environment.

Over time, many of these models develop into theories and are christened with catchy monikers. Lean Thinking, Theory of Constraints, and Activity-Based Costing are all examples. Often, those catchy monikers can be expressed in even catchier three-letter acronyms like TOC, ABC, JIT, and BTO. If they are fundamentally sound, these theories attract enthusiastic followers. The most enthusiastic of these followers then become “zealots” and zealots generally get out of control.

These zealots often become true “monotheorists.” Not only does the zealot’s theory become the universal theory – the one true faith – but his or her perspective becomes the only appropriate perspective from which to view that theory. All other theories and perspectives are false and their advocates are heretics. They will all be damned to the eternal flames of business failure. Zealots then find ways to prove their theory is the only true theory by engaging it in a match against other theories. This is usually accomplished through an example or case study that compares the zealot’s theory against a competing theory in a situation where the zealot’s theory is relevant and the competing theory is either misused or simply does not apply. The one true theory then easily prevails against the “straw man” against which it was matched.

Not all advocates of these theories become zealots, but it seems as if the most vocal among them do. As a result, much of the material written or spoken about these theories implies that the entire organization must be changed to support the theory of choice and that all of the other needs of the organization can be ignored.

Unfortunately, we have yet to come up with a valid universal theory. As a result, we must deal with competing theories, all of which apply in certain situations, but not in all situations. The task for top executives is to understand where and when each theory applies.

As a consultant who deals primarily with small and mid-sized business units, my “internal versions” come, like everyone else’s, from a particular perspective. In developing those “internal versions,” I consciously try to put myself in the place of *the top executive of a family-owned and operated business who hopes to perpetuate that business as a vehicle for supporting his or her family in a luxurious manner for generations to come*. I can think of no other individual whose perspective would be more conducive to using the available business theories and tools in the most effective manner. Since there appears to be no “universal theory,” I must work with those that are available in order to reach my objective. Hence, my life as a pagan, believing that different theories are required for different situations.

We are fortunate, however, in that valid theories are not mutually exclusive in spite of what the zealots may imply. When used appropriately, they actually support and validate each other. Such is the case of accounting for the lean enterprise where three theories in particular meet to provide a powerful perspective for the manager and decision maker: lean thinking, decision economics, and activity-based costing.

LEAN ACCOUNTING vs. ACCOUNTING FOR LEAN

I have noted in the literature and in talking with business executives that the phrase “lean accounting” has two different meanings. In one situation, it means applying lean concepts to the activities of accountants. In another, it means accounting practices that support a lean environment. Sometimes it is combined, meaning the elimination of activities performed by accountants due to the simplification of other business activities that result from the application of lean principles. In this paper, I will be addressing the second of these definitions; how to develop costing practices that *enable an organization that has embraced lean thinking to exploit the benefits that have resulted from its lean initiatives*.

COST INFORMATION AND BUSINESS DECISIONS

If you listen to many (not necessarily all) lean thinking advocates, you would think that the primary purpose of cost information is to obstruct lean thinkers in their quest for the lean enterprise. Their objective in reforming cost information is to focus it entirely on highlighting the benefits of their lean initiatives and eliminating as many of those non-value adding accountants as possible. From an organization-wide perspective, however, cost information is required as input for a wide variety of business actions and decisions, not just to support lean initiatives. As a result, it is dangerous to design a company’s costing practices around the perspective and perceived needs of only one segment of the business.

Pricing Decisions

Even a lean enterprise needs to make pricing decisions – although if you believe some writers on the subject, you would think that the execution of lean initiatives makes pricing decisions unnecessary. Just charge the market price. Anyway, cost has nothing to do with price; the market determines the price. Although the statement in the previous sentence is correct, the conclusion it implies is not. Cost has nothing to do with price. It does, however, have *everything* to do with whether or not a company should want to sell a product or service at the price the market is willing to pay. Lean initiatives will enable the company to be profitable at lower prices, but not at any price.

An organization must carefully manage its “portfolio of business” if it is to be successful in the long-term. Even though it does not need to “make money” on every single thing it sells, it must be able to understand how each product, service, customer, and market contributes to its overall portfolio of business. Before accepting any order, even the lean organizations needs be able to answer questions such as: Will this order cover the product’s or service’s “fully-absorbed” cost (its cost after picking up its fair share of the cost of all activities it requires of the organization)? If it doesn’t, will it at least cover the incremental costs it causes the organization? If it covers the incremental, but not the fully-absorbed cost, is it still in the company’s best interest to accept the order? Will it be tying up a critical “bottleneck” operation that will prevent us from accepting more attractive orders later, or will it just use ancillary operations where we have a great deal of excess capacity?

Even though cost does not determine price, cost information, both fully-absorbed and incremental, is critical for intelligent, fact-based pricing decisions. It may only take one bad pricing decision to ruin an otherwise sound company.

Investment Decisions

Before committing funds to accomplish an objective, either capital expenditures or expense projects, a company must be able to predict the consequences of its proposed actions. One of those consequences is the change in costs. If the expenditure is to reduce costs, by how much will they be reduced? If it is to improve efficiency, how much will it reduce costs if volume stays the same? What will be the incremental cost of increased volume if the efficiency improvement opens up salable capacity and how will it impact the fully-absorbed cost of our existing products and services? If the expenditure is for expansion, how does the increase in total cost compare to the increase in revenues expected from that expansion? How does the change in unit cost resulting from the expansion impact the prices the company can accept in the marketplace?

Investment decisions have a long-lasting impact on an organization. Large amounts of money are irreversibly committed to an action because it is deemed a better use of those funds than any alternative action available. The ability to accurately predict the impact on costs of the available uses of investment dollars is critical for an organization’s long-term success.

Other Decisions and Actions

Many other decisions and actions require accurate and relevant cost information. Should a process be outsourced? Should one be brought inside? Would the company be better off working

overtime or adding another shift? Should the company use contract workers or hire more employees? Would it be better to add workers and speed up the line, or work at the current line speed with the current workforce? Fact-based answers to these and many other critical questions must be made available to decision makers if the company is to succeed.

Without accurate and relevant cost information to support these decisions, executives and managers will either be “flying blind” or even worse, be looking at the world through distorted glass. At least when you’re flying blind, you know you can’t see anything. When you look at the world through distorted glass, you are deceived into believing that what you see is an accurate representation of the facts when the world on the other side of the glass is nothing like what you see.

Inadequacy of Traditional Cost Methodologies

There is very little argument with the statement that traditional labor- and machine-based costing methods (please, stop saying *standard costing* methods when you mean *traditional costing* methods – standard costing is an entirely different subject) are inadequate. Although most organizations have done little or nothing to improve their costing practices, 98% of the senior financial executives included in the 2003 Survey of Management Accounting indicated that they believe their company’s current costs are inaccurate.³ This is true whether or not inaccurate costs’ impact on lean initiatives is an issue. Action must be taken to correct these deficiencies if a company’s decision makers are to have a fighting chance in today’s hyper-competitive business climate. This is true whether or not an organization has gone, or is planning on going, lean.

CREATING A METHODOLOGY THAT SUPPORTS THE ENTIRE FIRM

The *structure* for developing a cost methodology that provides decision makers and managers throughout an organization with the accurate and relevant cost information they need to do their jobs effectively is provided by *activity-based costing*. Activity-based costing is not the entire answer, but it provides the structure for the solution.

Unless a company sells a standard product, in a common way, to a homogeneous market, oversimplified costing practices like those suggested in Karen M. Kroll’s July 2004 article in *Journal of Accountancy* titled “The Lowdown on Lean Accounting,” will simply not suffice. In the article Ms. Kroll states,

“For starters, rather than categorizing costs by department, they organize them by value stream. A value stream includes everything done to create value for a customer that can reasonably be associated with a product or product line...Among the costs in a value stream would be the expenses a company incurs to design, engineer, sell, market, and ship a products as well as costs related to servicing the customer, purchasing materials and collecting payments of product sales.”⁴

Although not directly stated, inclusion of the actual performance of manufacturing operations or providing the company’s services appears to be included as well. A methodology treating all items traveling through the value stream as equal, like the one outlined, might work well for short-term performance measurement and even some short-term decisions, but it falls apart when considering an organization’s long-term sustainable economics.

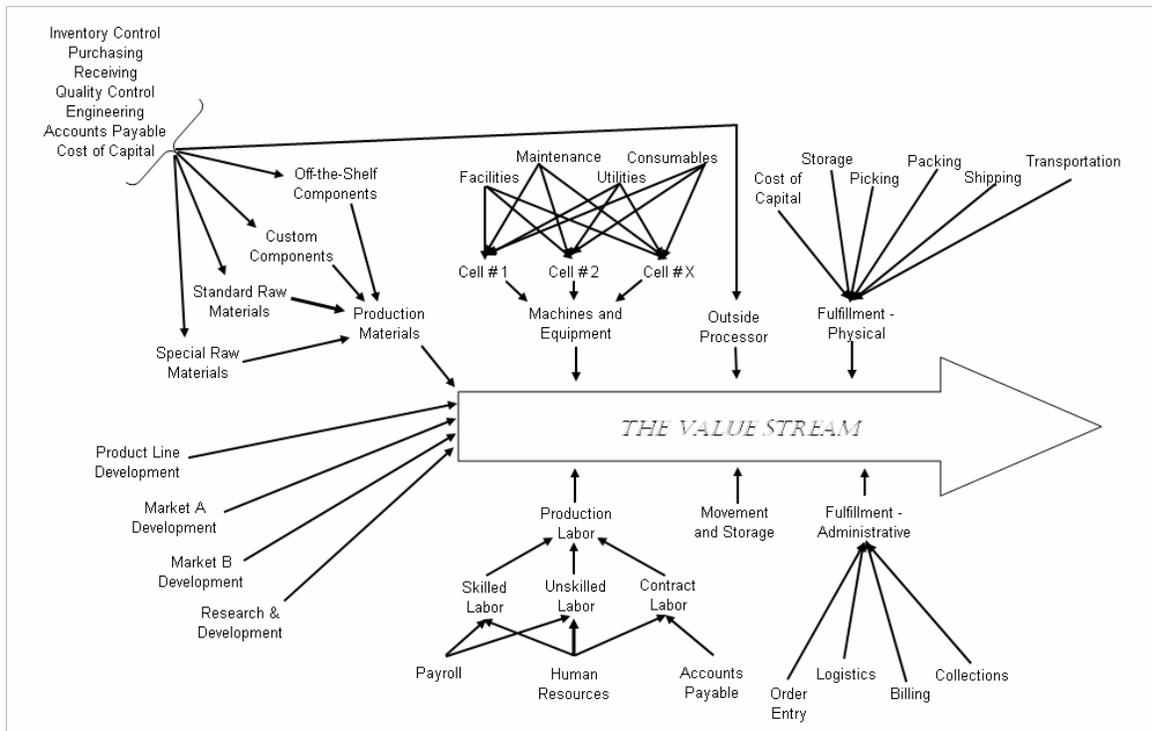


Figure 1 – Value Stream of Non-Homogeneous Manufacturer

In discussing activity-based costing’s role in accounting for the lean enterprise, I will use the example of a \$14 million manufacturer that has already made significant strides in transforming itself into a lean organization.⁵ Its major action thus far has been to reorganize its former “job shop” environment – with like kind equipment grouped together and product moved from machine to machine as necessary – into a group of similar work cells. The issues and relative numbers in this example are based on an actual client of mine that began their lean adventure about three years ago. A general view of its value stream is shown in Figure 1.

As mentioned above, this manufacturer has adopted a lean approach to manufacturing. Where it was once organized as a job shop it has reorganized into a group of similar cells where manufacturing flows continuously, with one exception, from start to finish. The exception takes place on about 10% of its products that must be treated by an outside processor mid-way through the production process. These cells have eliminated much of the company’s raw, in-process, and finished goods inventory, shortened its cycle times, and provided many of the other benefits promised by lean thinking.

It would, however, be foolhardy for this manufacturer to pool all of its cost into a single value stream and ignore the unique attributes of individual parts that make them different. Even establishing a separate value stream for each cell would be inadequate. There is too much variety to be considered. Perhaps not within the one-day, one-week, or even one-month time horizon of a production manager, but when considering the longer-term sustainable economics that are critical for pricing, capital investment, outsourcing, strategic planning, and other decisions, such generalizations can be fatal. This company simply has too much variability among the materials and components from which its products are made, among the markets it serves, and among the customers within those markets.

Costing the Primary Value Stream

In constructing a costing methodology for a manufacturer that uses cells or lines, it is appropriate to establish an activity center for each type of cell or line. These can be viewed as the “primary” value streams. It is not necessary or desirable for each individual cell or line to be its own activity center – but those with significantly different structures or configurations should not be “pooled” with others. Each of these activity-centers would then represent a primary value stream that is common to all of the products produced in any one of the activity center’s cells. All of our example manufacturer’s cells are configured in a similar manner. That general configuration is shown in Figure 2. In each cell, the operation represented by Machining Operation No. 2 is the cell’s constraint.

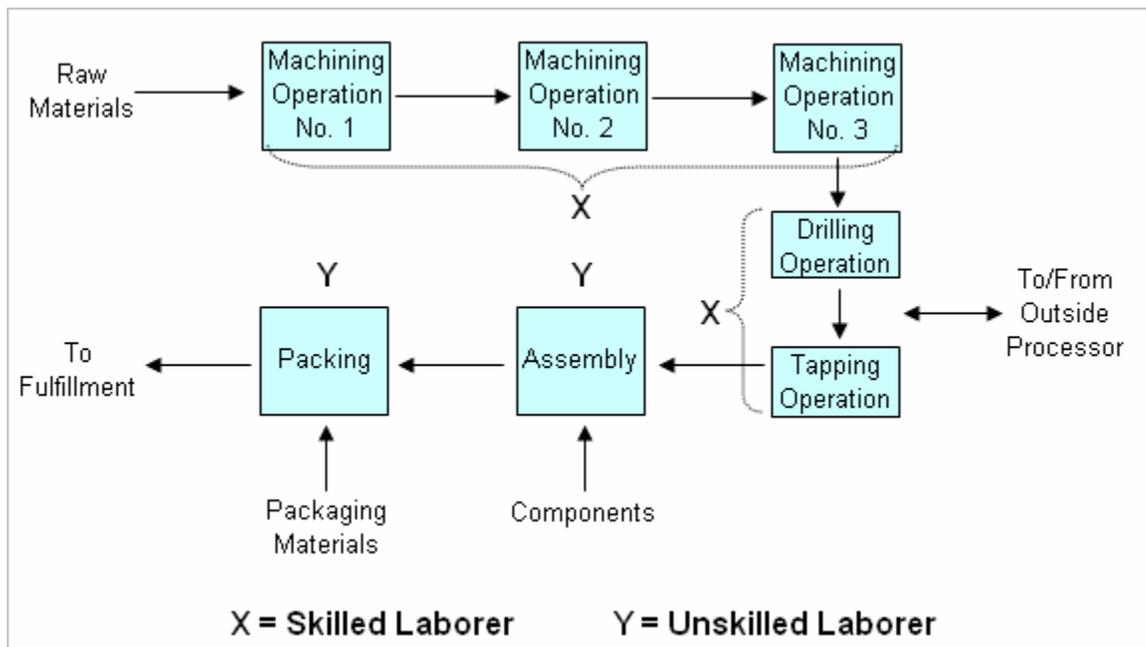


Figure 2 – Base Manufacturing Cell

90% of the company’s products flow through these cells uninterrupted. The other 10% must go to an outside processor after the drilling operation and re-enter the cell when they return. To “maintain the flow,” the company always manufactures products requiring outside processing in common-sized batches that are scheduled only when there are parts that have returned from the outside processor to merge back into the cell when the semi-completed parts must exit. For a majority of the products manufactured, the cell requires two skilled workers (for the machining, drilling, and taping operations) and two unskilled workers (for assembly and packaging).

If all of the operations were used all of the time on all of the parts, and all of the parts used the same materials and components, and all were distributed the same way, then the collection of all costs related to this value stream – material, material support, outside processing, equipment, maintenance, utilities, tooling, labor, order fulfillment, etc. – could simply be assigned to the cell and each product’s cost based on its velocity through the cell. As will be seen, however, this organization’s non-manufacturing activities are no where near being proportionate with its manufacturing costs. Even a cursory examination will show their inclusion in cell cost to be absurd. Furthermore, not all of the manufacturer’s parts require all of the operations in the cell. Some only require two machining operations, some require no assembly,

and some do not get individually packaged, they are simply shipped in bulk in corrugated boxes. Some may omit combinations of these operations. Two of the alternative uses of the cell, for Parts A and B, are shown in Figures 3 and 4 respectively.

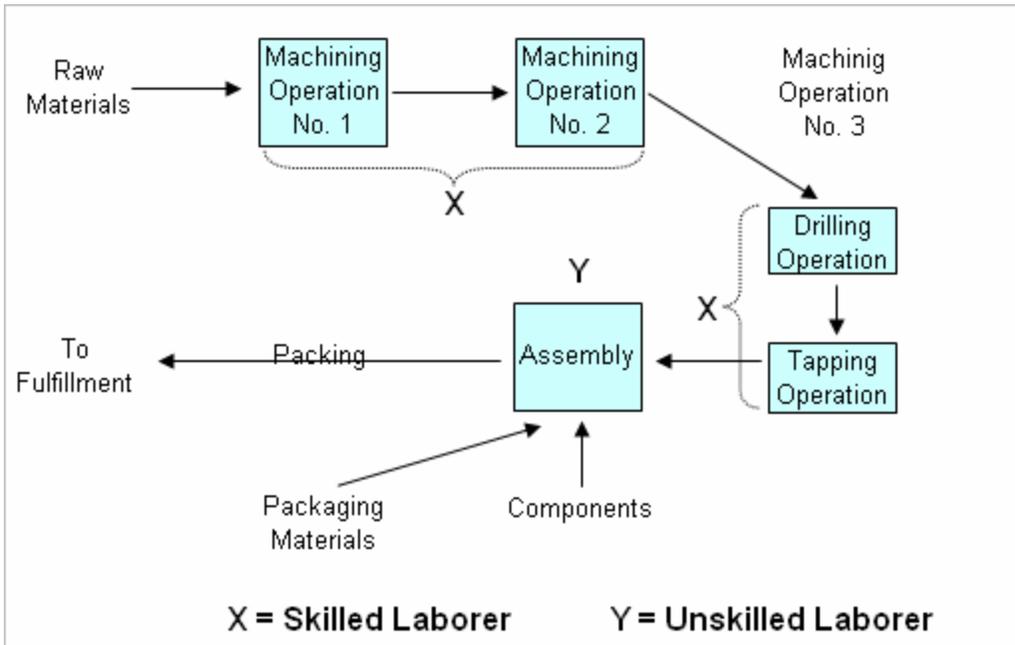


Figure 3 – Cell Configuration for Part A

Part A does not require a third machining operation, is not sent to the outside processor, and is packaged in a large corrugated box upon completion. As a result, only one unskilled

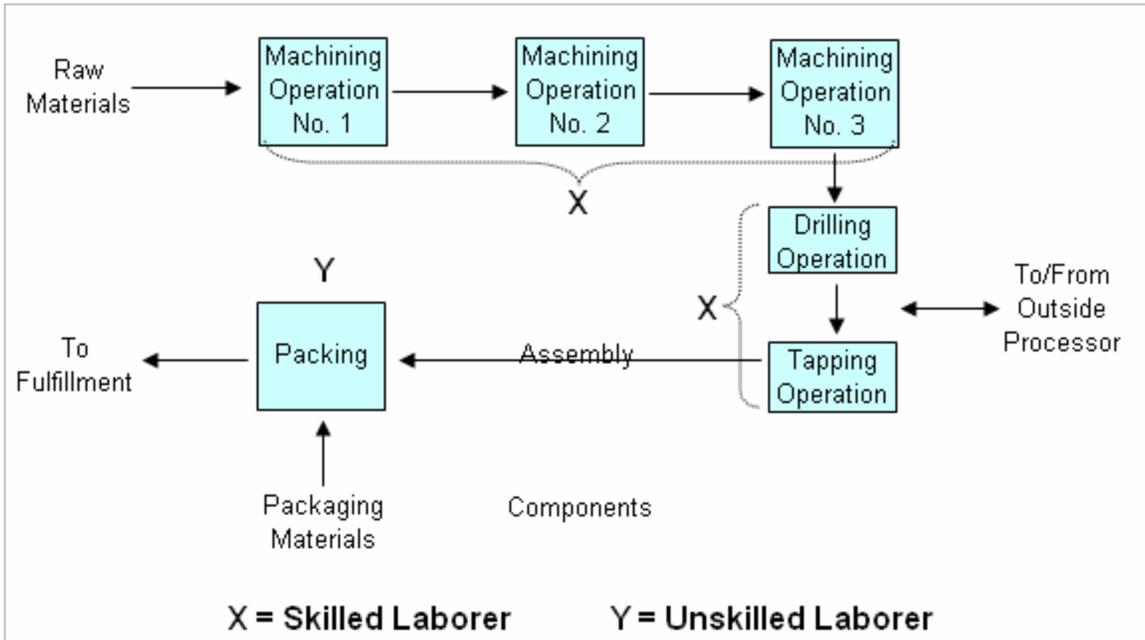


Figure 4 – Cell Configuration for Part B

laborer is required and both of the skilled laborers are underutilized (the drilling/tapping operator does not need to perform the extra material handling required when an outside process is involved). Nevertheless, both skilled laborers must still work in the cell full-time. Part B, on the other hand, requires no assembly. As a result, one of the unskilled workers is not required.

It should be intuitively obvious that the cost of operating the same cell in each of these three configurations is different. But how can we quantify these differences? The answer is quite simple.

There are four factors involved: occupancy of the cell, operation of equipment, use of skilled labor, and use of unskilled labor. In all cases, the entire cell is occupied during production and cannot be used for any other purpose. In some cases, only four of the high cost operations are used (machining, drilling, and taping) and in other cases all five are used. In all cases two skilled workers are required, but some configurations only need one unskilled worker instead of the standard two. The answer is to accumulate the cost of each of the four factors that go into the cell separately and develop rates to assign those costs to a cell based on the required configuration to produce a specific part – in effect, “rental rates” for the cell based on which resources it needs to rent.

For example, our manufacturer’s cost of owning the equipment in the cell and occupying the space in the plant amounts to \$200 per hour, including a *cost of capital* (cost of capital, which is a critical element in accounting for lean is discussed in more detail later in this paper). The cost of operating one of the machines in the cell for one hour is \$40. Finally, the cost of skilled and unskilled labor (fully-loaded with fringes, taxes, supervision, and support) are \$32 and \$22 per hour respectively. A comparison of the hourly cost of operating each of our three cell configurations – remember, this is the same cell used three different way, not three different cells – is shown in Figure 5.

Description	Cost per Hour		
	Cell Cost - Base	Cell Cost - Part A	Cell Cost - Part B
Cell Occupancy	\$200	\$200	\$200
Machine Operation:			
No. of Machine Used	5	4	5
Cost per Machine Hour	\$40	\$40	\$40
Production Labor - Skilled:			
No. of Workers	2	2	2
Cost per Labor Hour	\$32	\$32	\$32
Production Labor - Unskilled:			
No. of Workers	2	1	1
Cost per Labor Hour	\$22	\$22	\$22
Cell Cost per Hour	<u>\$508</u>	<u>\$446</u>	<u>\$486</u>

Figure 5 – Comparison of Cell Costs with Different Configurations

The cost of producing Part A in the cell is 12% per hour less than the cost of the basic cell. Part B’s cost is 4% less. Having such a variance in the hourly cost of the company’s primary value stream is not insignificant, especially in a highly-competitive environment. But that’s not the only difference!

Costing the Primary Value Stream's Tributaries

As is clear from Figure 1, there is more to understanding the cost of this manufacturer's products than just the cost of their production. They are not all made from the same material or use the same components. Some materials are common and require very little effort to purchase, handle and store. The inventory levels for these materials are relatively small. Others are special, requiring much more purchasing effort and higher inventory levels. The same is true of common and special components. In addition, the services of the outside processor must be purchased and managed, those parts involved require extra handling to get them to and from the outside processor, and inventory is tied-up while those parts are at the outside processor.

About 50% of the company's parts are part of a product line it maintains. The maintenance of that product line costs money, money that has nothing to do with those parts the company makes as a contract manufacturer; producing parts designed by the customer. Instead, those parts require an up-front investment as engineers and manufacturing managers plan their production – costs not required by parts in the product line.

A minority of the manufacturer's customers, about 20%, are considered high-maintenance customers. Their special demands require a disproportionate amount of marketing, engineering, and general management time. These excess cost also need to be segregated and assigned only to the products produced for those customers.

Finally, very few parts are shipped directly to the customer immediately after production. The vast majority are stored, some for as short as a few hours and others as much as two weeks, until a release is received from the customer authorizing shipment (although the manufacturer has reduced its manufacturing lot sizes from several hundred to ten or twenty, it has yet to achieve Nirvana with lot sizes of one). Some customers will order dozens of a single part number each time, while others will order one or two of many different parts. The cost of fulfilling the orders of these different customers will be considerably different.

The costs related to these "tributaries" to the primary value stream can have a significant impact on the total cost of manufacturing and delivering parts to each customer. That impact can be measured by establishing activity centers to accumulate the costs involved in each one. At our example manufacturer the relationship between the *prices* of purchased materials and components and the *costs* of having them on hand and delivered to the manufacturing cell when needed are as follows:

Common raw materials	2%
Special raw materials	9%
Common components	4%
Special components	17%

A common raw material with a price of \$1.00 per pound actually costs \$1.02 (again including a cost of capital) delivered to the cell. A special raw material with the same price actually costs \$1.09 per pound. A common raw material with a price of \$1.00 costs \$1.04 by the time it arrives at the cell whereas a special component of the same price costs \$1.17. Again, this is not an insignificant difference to an organization fighting to succeed in a competitive market. In addition to these outside purchases, the cost of acquiring and managing an outside processor, handling the parts in and out, and tying up extra inventory adds 13% to the price of the service provided.

The costs of the other tributaries to the primary value stream at this manufacturer are summarized as follows:

Product line maintenance	2% of the internal costs of a part
Moving finished parts to storage	\$ 13.00 per container
Storing a finished part	\$.46 per part
Processing an order	\$ 50.00 per order
Picking an order	\$ 1.00 per line item
Packaging an order	\$ 11.00 per order
Processing a shipment	\$ 24.00 per shipment
Dealing with a low-maintenance customer	4% of the internal cost of a part
Dealing with a high-maintenance customer	18% of the internal cost of a part
General and administration	10% of the internal cost of a part

The “internal cost” of a part is the sum of all its costs with the exception of materials, components, and outside processing – thereby including only the costs incurred *internally* by the organization, the cost of its activities.

It doesn’t require detailed calculations to realize that if Part A is made from common materials and components, is packaged in a corrugated container at the cell, shipped almost immediately in that container to its customer who, by the way, happens to be a low-maintenance customer, its cost will be much less than a part from the company’s product line, made in the basic cell from special materials and components (and requiring outside processing), shipped in a daily variety pack to its customer, who happens to be a high-maintenance customer.

Looking at a costing structure for a lean enterprise exclusively from a short-term perspective and not acknowledging the long-term, sustainable economics of each individual product and its customer is a good way of putting the organization at risk of “leaning itself into oblivion.” There are critical uses of cost information beside the measurement of manufacturing effectiveness. A lean enterprises’ perspective must be from the top of the pyramid, not near its bottom, as suggested by many advocates of “lean accounting,” if decision makers are to have the cost information they need to lead the organization into a profitable future.

Obviously, the construction of the method suggested in this paper was based on activity-based principles. But those are not the only principles that are critical for the lean enterprise. It must also take into account costs as measured by the managerial economist.

ACCOUNTING COST vs. ECONOMIC COSTS

Most practitioners of activity-based costing use the activity-based structure they develop to “crunch” general ledger costs in a theoretically sound manner. This is a noble activity, indeed, and helps many organizations improve their profitability. But only part of the mission has been accomplished. Accounting costs, the cost being “crunched,” do not provide a true picture of the actual economics of an organization.

My 1999 book, *Activity-Based Costing: Making it Work at Small and Mid-Sized Businesses*, contains an entire chapter on “the deadly virus of GAAP (Generally Accepted Accounting Principles).” In that chapter I discuss a variety of accounting conventions that distort the true economics of an organization. They range from accounting expenses that are actually investments to the distortions caused by depreciation expense. All of those “viruses” are still

valid and apply at lean enterprises. I will, however, not repeat them here. You can find a copy of the book and read the chapter. The book, however, does not include one “virus” that is critical to accounting for a lean enterprise. Its exclusion was due the fact that, at the time the book was written, we had not yet developed an acceptable answer (to us at least) for that shortcoming. That “virus” is the absence of a cost of capital that is assignable to specific activities.

Cost of Capital

The cost of capital represents the profit an investor in an organization is “passing up” in order to invest his or her money in that organization. Let us suppose I have an investment worth \$100,000 (note it is worth \$100,000 – that is not what I paid for it) in a company whose value is growing at 10% per year. There is another, equally risky company in which I could invest that money whose value is growing at 12% per year. My investment is actually losing me 2% - the 10% I’m actually earning less the 12% I could be earning in an alternative investment of equal risk. If the company in which I am invested wants me to keep my money invested in them, it will have to find a way to provide me with a 12% return – that is its cost of keeping my money – its cost of my capital.

There are basically two sources of funds for a business organization; investors (equity) and lenders (debt). Lenders are paid interest for their willingness to temporarily provide the company with funds. Compensating investors is a little more complex, it includes a combination of dividends and growth that, it is hoped, provides a greater return than the investor can get from another equally risky investment. Although the cost of money received from lenders (interest expense) is duly recorded as a cost on the books, the cost of money received from investors (dividends and growth) is no where to be found! Dividends are not costs and, therefore, are not recorded as such on the books. Growth in value does not result in any debits or credits on the books at all, only in the investors’ portfolios.

Why is this important in accounting for the lean enterprise? It is important because lean thinking enables a company to “do more with less.” There are two parts to that statement; *do more* and *with less*. Accounting for the lean enterprise must be able to track both, not just *doing more* but also *using less*. Unfortunately, there is nothing included on a company’s books that either 1) records the cost of equity or 2) assigns a cost of equity and debt to the activities and process in which the funds provided by that equity and debt is invested. As a result, *accounting for lean without an assignable cost of capital fails to either accurately measure the benefits (or potential benefits) of individual lean initiatives or incorporate their cumulative benefits into the economic model of the organization used by executives and managers to support critical decisions and actions.*

Before going further, it is important to emphasize one critical point. The inclusion of a cost of capital is an essential element in accounting for a lean enterprise – as a matter of fact; it is an essential element in accounting for any enterprise, but that is not a topic we will address here. The precision with which that cost of capital is calculated is only secondary. As Alfred Oxenfeld so succinctly put it decades ago, “An error in estimating the magnitude of an effect usually is far less serious than mistakes due to wholly overlooked consequences.”⁶ It is the overlooked consequences of increasing or decreasing the funds tied-up in an organization that is the problem, not the precision with which those consequences are calculated.

For example, a cost of capital of 10% was included in the activity-based cost information for the manufacturer used earlier. A comparison of its costing rates without a cost of capital and

with different costs of capital is shown in Figure 6. It should be noted that a 10% cost of capital represented 9% of the manufacturer's total internal costs and 5.1% of its total costs.

Activity Center	No Cost of Capital	Cost of Capital Included @			Rate Basis
		8%	10%	12%	
Material Support Activities:					
Common Raw Materials	1%	2%	2%	2%	2% of internal cost
Special Raw Materials	8%	8%	9%	9%	9% of internal cost
Common Components	3%	4%	4%	4%	4% of internal cost
Special Components	16%	17%	17%	17%	17% of internal cost
Outside Processors	11%	13%	13%	13%	14% of internal cost
Value-Adding Activities:					
Cell Occupancy	\$125	\$185	\$200	\$215	per cell hour
Fulfillment Activities:					
Storage	\$0.25	\$0.42	\$0.46	\$0.50	per unit

Figure 6 – Impact of Cost of Capital on Rates

The actual calculation of a cost of capital is imprecise; there are a variety of ways suggested by individuals much more knowledgeable on the subject than I am. This is especially true for privately held firms with no easily measured “value” (remember, it is the value of an investor's investment that is important – the amount he or she could realize by selling it – not the original amount invested that counts). But it should be easily recognized from our example manufacturer's numbers that omitting the cost of capital from its calculations is far more serious than missing the correct number by 20%.

Calculating a Cost of Capital

As mentioned earlier, a company's funds come from two sources: investors and lenders. Some lenders are trade creditors. The money they lend to the company carries no interest cost. More formal debt requires the payment of interest expense which is tax deductible. As a result, its cost to the company is net of income taxes. The return provided to investors is not tax deductible by the company. It must be included in its entirety.

The cost of capital calculation for our example manufacturer is shown in Figure 7. The average interest on company debt is 8% which has been reduced by the company's income tax rate of 35% to a net of 5.2%. Trade credit is free. The estimated available return to shareholders from an equally risky investment elsewhere is 13%. Shareholders' equity in the company is not shown as \$4,750,000 on its books. The \$4,750,000 represents the difference between the company's estimated market value and the amount of debt on the books. This approximates the amount of money shareholders are foregoing in order to keep their funds in this business – their actual investment.

Source of Investment	Amount of Investment	Net Cost of Investment	Cost of Capital
Company Debt	\$2,000,000	5.2%	\$104,000
Trade Credit	\$500,000	0.0%	\$0
Shareholders' Equity	<u>\$4,750,000</u>	13.0%	<u>\$618,000</u>
Total Company Value	<u>\$7,250,000</u>	<u>10.0%</u>	<u>\$722,000</u>

Figure 7 – Calculation of Cost of Capital

Calculating the cost of capital on the debt is fairly straight forward. That on the shareholders' equity requires assumptions. Should the cost of shareholder's equity be estimated as 15%, the overall cost of capital would be 11.3%? If it is estimated at 11%, the cost of capital would be reduced to 8.6%. Again, it is the inclusion of a cost of capital that is critical. The way it is calculated is secondary.

Assigning the Cost of Capital to Activities

Assigning the cost of capital to individual activities first requires the assignment of the shareholders' value to the organization's activities – much in the same way that a company purchasing another company assigns the acquisition price to the acquired company's assets. In the case of our example manufacturer, the \$7,250,000 was assigned as shown in Figure 8.

Activity Center	Value Assignment	Cost of Capital Rate	Cost of Capital
Administrative Activities	\$390,000	10%	\$39,000
Material Support Activities:			
Common Raw Materials	\$80,000	10%	\$8,000
Special Raw Materials	\$80,000	10%	\$8,000
Common Components	\$50,000	10%	\$5,000
Special Components	\$50,000	10%	\$5,000
Outside Processors	\$100,000	10%	\$10,000
Value-Adding Activities:			
Cell Occupancy	\$5,000,000	10%	\$500,000
Fulfillment Activities:			
Storage	\$500,000	10%	\$50,000
Accounts Receivable	<u>\$1,000,000</u>	10%	<u>\$100,000</u>
Total Cost of Capital	<u>\$7,250,000</u>		<u>\$725,000</u>

Figure 8 – Assignment of Capital Cost to Activities

The resulting cost of capital for each activity was then included as an activity center cost like any other cost; labor, utilities, supplies, etc. If the investment in an activity is increased or reduced, a corresponding increase or decrease in the cost of capital is its consequence.

If a lean enterprise does not have the ability to measure the value of “using less” as well as “doing more,” it cannot document the full benefit of its lean activities and incorporate those benefits into its pricing, investment, and other top-level decisions. After all, an action that results in “doing the same with less” might be more beneficial than another that results in “doing more with less” if the reduction in investment is large enough. Without incorporating a cost of capital in its cost information, the lean enterprise will not have all of the appropriate information it requires to manage itself effectively.

MEASURING PRODUCTION PERFORMANCE

A major concern of many writers about accounting for the lean enterprise seems to be its impact on measuring short-term performance of production activities. This suggests a fundamental question: “Why is accounting information being used to measure production performance in the first place?”

Historically, cost accounting systems were designed to support the financial and tax accounting systems. There was no way around financial and tax accounting, it was dictated by laws, regulations, and the demands of investors and bankers. As a result, companies invested in cost accounting systems that were designed to meet these requirements in the least costly way possible. The ineffective cost accounting systems still prevalent today are the legacy of those requirements. However, information related to costs is also required for other variety of other management activities of which decision making and performance measurement are just two.

Because the cost accounting system was already available and management had no desire to invest a lot more money in developing and maintain another accounting system, the cost system’s information – however inadequate – was used to support these other activities. In most cases, it was never the appropriate information to use in the first place. For decision makers, it became simply a matter of “when you don’t have the stuff you need, you use the stuff you’ve got.”

It should be obvious that cost accounting calculations based on historical general ledger costs is of little or no use in supporting management decisions. We can use history to glean as much information as possible about costs, their causes, and their relationship to activities performed, but absolute numbers from history have very limited utility. After all, actual results are just the record of “a bunch of aberrations that will never be repeated.” They do not reflect the future, the time period in which all of the consequences of the decisions executives will make and actions managers will take will take place. To measure the future, we need a valid model of the organization, not a myriad of historical calculations.

Similarly, it has become clear that cost accounting information – including all of its precise calculations and allocations – is not an effective way to measure the performance of all or part of an enterprise. During the past decade, many new powerful and practical ideas have arisen for measuring the performance of an organization. These performance management and balanced scorecard methodologies are far preferable to cost accounting information, whether based on an old, ineffective methodology, or a new activity-based methodology, for measuring short-term production performance.

Why then should we even attempt to modify costing methodologies to do something it is not designed and ill-equipped to do in the first place? Trying to modify cost accounting information in a way that enables it to effectively measure short-term production performance is like trying to modify a screw driver to cut wood. It can probably be done if you spend enough time and money, but isn't it a lot more appropriate – and easier – to own both a screw driver and a saw? A lean enterprise needs to incorporate another of those “different gods for different purposes” – this time Performance Measurement – if it wants to effectively measure the performance of its short-term manufacturing operations.

FULLY-ABSORBED vs. INCREMENTAL COST INFORMATION

Earlier I mentioned that using the structure of activity-based costing to “crunch” general ledger cost information was useful, but only accomplished part of the objective. The first shortcoming was the failure to modify accounting costs to reflect economic costs, including a cost of capital. The second shortcoming is limiting the use of activity-based costing to accurately assigning costs to processes and products or services.

The same rationale that goes into linking costs to activities and activity costs to products and services works in reverse! An effective activity-based model of an organization must also be able to take an assumed volume and mix of business, project the activities required to support that volume and mix, and then calculate the total costs to provide those activities. This includes the ability to modify the “linkages” between products, activities, and costs – the linkages that change as decision makers make decisions and take actions.

Decisions being made and actions being taken today have an effect on the future, not the past. An organization needs to be able to use its activity-based model to determine how things will look – not how they would have looked in the past – as a result of a decision or action under consideration. Most decisions and actions require the measurement of *incremental* cost information – the actual change in cost that will result from a specific decision or action. Even when *fully-absorbed* costs are appropriate, what they were in the past is totally irrelevant. What is relevant is what those fully-absorbed costs will be in the future.

As a result, the lean enterprise requires a forward-looking, activity-based cost model that is populated with economic cost information (including the cost of capital) if it is to be able to exploit the benefits it gains from its lean initiatives. Oversimplifying the recording of historical costs by assigning them to over-generalized value streams might make cost information more useful in evaluating short-term performance – a use for which it was not intended in the first place – but will also encumber decision makers with an invalid economic model of their organization which will undermine the quality of their decisions.

SUMMARY

Cost information based on a model that was designed to serve the needs of financial and tax reporting does not serve the management of a lean enterprise well. As a matter of fact, it does not serve the management of any enterprise well. Unfortunately, simply associating the majority of the company's costs with its value stream, an approach suggested by some of lean thinking's ardent supporters, does more harm than good.

To exploit the benefits generated by its lean thinking initiatives, the lean enterprise needs to incorporate the structure of activity-based costing and the cost measurements of managerial economics into its decision making models.

The precepts of activity-based costing incorporates the characteristics of a lean enterprise into a cost model of the organization while still carefully isolating those differences that have an impact on the final cost of a product or service delivered to a customer. It also provides the mechanics for not only assigning fully-absorbed costs to products, services, and customers, but also performing incremental cost calculations for the myriad of decision situations for which incremental cost is the only relevant cost information.

The use of economic costs defined using managerial economic concepts – as opposed to accounting costs defined using GAAP – provides the lean enterprise’s management with the true measures of the economic consequences of its proposed actions that are needed to insure the quality of their decisions. Especially important is the inclusion of the cost of capital. Only by including cost of capital can the “with less” portion of “doing more with less” be incorporated into the lean enterprise’s calculations.

By itself, lean thinking can provide an organization with tremendous short-term benefits. To effectively exploit those benefits over the long-term, however, the lean enterprise’s management still needs to make quality, fact-based decisions. Without including activity-based costing and managerial economics into its decision making equations, the lean enterprise puts itself at risk of “leaning itself out of business.”

Footnotes:

- 1 Oxenfeldt, Alfred R., *Cost-Benefit Analysis for Executive Decision Making: The Danger of Plain Common Sense*, (New York, AMACOM Books, 1979), p. 67
- 2 Oxenfeldt, Alfred R., p. 67
- 3 Ernst & Young LLP/Institute of Management Accountants, *2003 Survey of Management Accounting*, (Ernst & Young LLP, 2003)
- 4 Kroll, Karen M., “The Lowdown on Lean Accounting,” *Journal of Accountancy*, July 2004, (New York, AICPA, 2004), pp. 72-74.
- 5 This example is based on an actual client of D. T. Hicks & Co. The company’s overall structure has been simplified and its numbers modified to make their presentation clearer and to maintain the company’s anonymity.
- 6 Oxenfeldt, Alfred R., p. 223